TMAS production.
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A) Elements:

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2. **Cameras**
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5. **Filter wheels.**
6. **Filters**
7. **Lenses**
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18. **Lab tests.**

B) TMAS tasks

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A) Elements:

1. ADC:

* Control software for the Newport 3 axis controller. (**Done. Sergi**)
* The ADC cells need to be blackened.
Needs to be aligned in the lab:
* Input laser beam (laser, holder, power supply, …). We will check if we can use the one used in Robo-AO.
* Overall alignment procedure to be consulted with Chris Shelton (JPL, jean.c.shelton@jpl.nasa.gov). (**Sergi/Richard**)

2.-Cameras

* "One camera for March/Two cameras, if possible, for June": 1 Neo (March) and, if possible, 1 iXon borrowed from RoboAO for June.
* Source of power supply for the cameras. AC 2 DC in the rack and then powers the camera. It will need a small box to convert AC into DC for the camera(s). (**Done**)
* For the Neo, we may go as low as -30 C easily with other cooling devices -such as air ones. (**Done**)
* Lengths of cables from TMAS to the rack. **5.8 m** from the top, end of the rack to the rear of the farthest camera (Neo sCMOS) in TMAS. **Done (see at the end).**
* Extension cables for the cameras (**all**) : Not a problem if fiber extensions are used.
So two options (**Richard**, final decision):
1) Order 5-6 m Camera link cables. No tested by the vendor (ANDOR). And takes sometime. The control computer (Stargate) goes in the rack. We would need a 6m cable for the potential iXon and the 'new' 5-6 m one for the Neo.
2) Use the available fiber optics in P200: Needs 1 converter box for each camera: Camera link to Fiber. The box can be placed on the exterior enclosure? The control computer, Stargate can then be in the control room. No need to buy other cables from the camera(s) than the one provided by the vendor.

Therefore, the difference in price is the box - the 6 m cable. IXon: $240 with a 5 WEEKS estimated (**Ernest**). Neo ? yet.
The Camera link-Fiber optic option could be something like ~ $ 1100 for a PHOX 24 bit.

3.-Coronagraph

We will use some occulting step (OD3) for the extragalactic program.

* In contact with ZR&C and waiting for a quote. Maybe we can also try alternative ideas from Christoph Baranec. (**Sergi**)

4.- Enclosure

* Needed for the lab testing. Orders for the frame and for the panels? Panels from Roger Smith? (**Jack/Sergi**)

5.- Filter wheels

* I need to meet Anna Moore for checking their functioning. Software and controllers installed. (**Sergi**)
* Attach them to the RAC. (**Ernest**)
We will have a set of UBVRI + "clear" 1-inch filters available for use, given by Gene Serabyn.
* OPTEC sells an 8 hole wheel for 1" ($245.00). Order it? (**Sergi**)

6.-Filters

We will have in addition a new set of filters given by Gene Serabyn (JPL).

To be decided together with the science case, before the end of the year. Clearly, V, R, I, but probably also H alpha. Look further into line emissions (Sulfur, OI, OIII) for extragalactic (redshift considered) and for planetary atmospheres (could be high angular imaging of circumpolar clouds in Uranus, for instance) (**Richard/Sergi**)

7.-Lenses

* They are at Cahill for the 3 configurations.

* Lyot stop: contact from Leyden to be given by Richard?

8.-Mechanical design

* The height of the P3K beam off the P3K bench is **170** mm, i.e., 6.69 inches. (**Done**)
The latter value means the following in terms of margin for cameras height: There is still .85 mm margin, Neo, and 5 mm margin for the iXon888 (RoboAO).
* 4 or 5-axis alignments for the ADC: 1 from Robo AO? The second one?
* The rear clear space behind the cameras for cabling is recommended to be 90 mm. It seems fine. Check in the final design, especially in the multicamera one. **(Sergi/Jack)**
* How to carry TMAS in the summit? Chart? (**Sergi**)
* A new feature is the incorporation of the linear stage for focusing the Neo camera. (**Richard/Jack**)

9.-Breadboard

* The breadboard is already in the lab.
* Pucks: Already at Cahill (**Jack has them**)
* We will be borrowing SWIFT clamps for June to attach TMAS to the P3K bread board..

10.-Optical design

* There are three foci: F1: 16 mas for Neo. F2: 10 mas for Neo. F3: 16 mas for Ixon.

* Final best field of view (as of first meeting, it secured the central 15 arcsec in the worst case). This will be taken into account in the data processing pipeline of some scientific cases. (**Richard/Sergi**)

* Mirror at the exit of P3K in TMAS: It is a fold mirror of 2-4". We need a mirror and a rigid mount. (**Sergi/Richard**)

11.-Stargate and GPU

* All in linux: good for communicating within the dome**. DONE**.

12. Room computer(s)

* This second computer can go in the summit or, as an alternative, we will install the control SW in a laptop.
* Communication of the windows machine with the control room: pointing of P200 with the rotation stages.
* Ultimately, we may want to test a full emulation in the lab, using the remote control room. -Jennifer has already used it with Stargate and the camera succesfully. (**Jennifer/Sergi**)
* External disks to bring back the data. We may consider to buy a couple of ~1Tb external disks. Not urgent. Evaluate the data volume according to the science program and the improvements in the data analysis. (**Sergi/Richard/Jennifer**)

13. Rack

* Locate enclosure panels (**Ernest/Richard**)
* Blank panels for the front. Find standard sizes to adapt the disposition in the rack to them. (**Jack**)
* Get a USB HUB: I brought one which works fine. (**Sergi**)
* Get a Network PS. Not urgent. (**Ernest**)

14. TMAS mouse-hole

* Measure its size. Sergi got:

* a circle of 0.8 inch, or equivalently:

* a semicircle of: 1.12 inch.

However, this is without the option of the iXon camera.

. Need a confirmation (**Ernest**?)Cables are:
ADC: 2 connector cables for the two rotation stages. 1 connector cables for the axis aligner.
Cameras. For each of them: 1 PCI-E link, 1 Power supply, 1 water pipe (in/out and only for the iXon888)
Filter wheels (IFWs). For each one: 1 power supply, 1 ethernet cable, 1 connector cable.
* Attention with potential unwanted illumination from the holes into TMAS: now some tape? another idea?

15. Redundant system.

* Replacement/Alternatives for breakdowns and failures of those components that are critical (Computer with Windows for the controllers). To be considered until June. (**All**)

16. Real-time data processing pipeline

The software to control the Neo Camera, a real time algorithm, good enough for point-like and extended sources is successfully implemented.

* Test the RAM/CPU capabilities of the GPU with some simulated images: readout speeds & array sizes. (**Jennifer/Sergi**)
* test the precision in the time stamps for the fast reading modes. Is it enough or do we need a GPS or is it available a fast communication with some summit device? (**Jennifer/Sergi**)
* Base-line algorithm is implemented. Discussion about improving its performance in time. (**Jennifer/Sergi**)
* Refined memory optimization (subarray processing, external array accumulation, etc …) (**Sergi**)
* Tests of scientific program targets (**Sergi/Jennifer**)
* Tests with ADC alignment (**Sergi**)

17. Assembling

***** Waiting for some pedestals from New Focus. Rest of pieces at Cahill. Integration expected in the week of 18th March. (**Sergi**)

18. Lab tests

* Tests of scattered light. (**Sergi/Richard/Jennifer**)
* Tests the real-time algorithm wrt to shifts of the camera. (**Sergi/Jennifer**)

B) TMAS TASKS

Richard:

* Decide if we go for fiber optics at the summit or for testing the extension cable for the Neo.
* Check the availability of some elements: fold mirror and mount for the P3K incoming beam.
***** Science program for the two nights (possible targets, priorities and alternatives, integration time, working temperature, filters, rough estimation of memory needs) with Sergi. Adapt the program to the Neo camera.

Ernest:

* Overall rack mounting, power supply, final check. (**Partly done**).
* Stargate in the lower end if *it finally goes in it*? It is not rack mounted.
* Check the mouse hole size.
* Check power supply.
* General check of the rack.
* More cables, connectors than the ones in item 14 above?

Jack:

* Enclosure: two orders, Frame and Panels: Roger Smith?
* Linear stage on a side of the enclosure.
* Blackening of anything that may reflect or scatter light. (ADC cells, panels, enclosure's frame).
* Blank panels for the front. Use standard sizes.

Jennifer:

* Discussion of refined processing algorithms, aimed at optimizing speed and less memory consumption according to the science target.
* Test of the algorithms in the lab.
* Think about the viability of using the windows PC that controls the ADC (and the IFW) at the summit (it needs to know the elevation of the pointing of the telescope)

Sergi:

* Do not forget to check for any design that "the rear clear space behind the cameras for cabling is recommended to be 90 mm. It seems fine". Especially in the multicamera one
* Enclosure. Roger Smith?
* Install the control software for the IFWS and test them.
* Input laser beam. Check available elements.
* Implementation of refined processing algorithms, aimed at optimizing speed and less memory consumption according to the science target.
* Test of the former in the lab.
* Try to find a means to carry TMAS at Palomar.

Lengths relevant for TMAS at P200:

Richard (from Jenny): Main beam height: 170.00 mm = 6.69 inch.

Richard:
Here are the measured dimensions from P3K, relevant to TMAS:

distance from (further) camera position to bottom of p3k encl cover (dropping down the side): 14"
end of bench over to Cass ring rotation axis: 24"
from p3K encl cover drop to cage floor: 44"
straight run along the floor of the Cass cage to the bottom of SE rack location where TMAS installs: 68"

Total 150" = 3.8 m

This gets us from the (further) camera position to the bottom of the TMAS rack, then we decide how far up and deep into the rack we want to go. Here is, I think, the worst case:

Rack depth 24"
Rack height 54"

So, the maximum total distance from the camera location to the back of top of rack = 228" = 5.8 m.